

CHAPTER 13

SHORTRAKER AND ROUGHEYE ROCKFISH

by

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Executive Summary

In 2005, BSAI rockfish have been moved to a biennial assessment schedule to coincide with the frequency of trawl surveys in the Aleutian Islands and the eastern Bering Sea slope. These surveys occur in even years, and for these years a full assessment of shortraker and roughey rockfish in the BSAI area will be conducted. The 2004 full assessment for BSAI shortraker and roughey rockfish can be found at <http://www.afsc.noaa.gov/refm/docs/2004/BSAIsrre.pdf>. In the odd years in which the surveys are not conducted, the existing model will be updated with new catch information and extended to the current year, and an executive summary containing the biological and fishing mortality reference points and the harvest projections will be presented. It is recommended that the ABCs from the updated model be used for 2006. As roughey and shortraker are not assessed with an age-structured model, a projection model was not used to produce the 2007 biomass and harvest levels. It is recommended that that ABCs and OFLs recommended for 2006 are carried over to 2007.

Summary of results

There is no change in the model structure from 2004, and the only change in the input data was an updated 2004 catch and adding an estimate of the 2005 catch. The 2004 catch was increased from the preliminary estimates of 184 t and 204 t for roughey and shortraker, respectively, to the final estimates 200 t and 212 t. The 2005 catch of roughey and shortraker, through Oct 8, were 85 t and 157 t, respectively.

The estimates of 2006 total biomass for roughey and shortraker are 11,945 t and 25,799 t, respectively. Relative to the estimates of 2005 biomass from the 2004 assessment, these values represent a slight increase of < 1% from the 2005 estimate of 11,913 t for roughey rockfish and a slight increase of 2.5% from the 2005 estimate of 26,470 t for shortraker rockfish.

Recommended ABC and OFL

As is previous assessments, it is proposed that roughey and shortraker rockfishes be managed under Tier 5 of Amendment 56 of the NPFMC BSAI Groundfish FMP, in which $F_{abc} = 0.75 * M$, $F_{ofl} = M$, and ABC and OFL values are obtained by multiplying the fishing rate reference points by the estimated biomass. This procedure results in the following BSAI ABCs and OFLs :

	2006 biomass	M	ABC	OFL
Rougheye rockfish	11,945	0.025	224 t	299 t
Shortraker rockfish	25,799	0.03	580 t	774 t

Area apportionment of ABC and OFL

On the basis of genetic information, it is recommended that the ABC be apportioned by area between the EBS and AI. Recent research indicates the existence of two species (denoted type I and type II) currently known as rougheye rockfish. In a study using over 700 samples from Oregon to the Aleutian Islands and the Bering Sea, Gharrett et al. (2005) found fixed allele differences at one microsatellite locus, with each of two alleles corresponding very strongly to mitochondrial DNA haplotypes. Aleutian Islands rougheye rockfish were predominately composed of type I fish. Both type I and type II rougheye rockfish occurred in the Gulf of Alaska, although type II fish were more common (particularly east of Kodiak) and any particular trawl haul was composed of predominately one type. Although most of the type II fish examined were lightly colored, the type I fish consisted of both lightly and darkly colored individuals. Currently, no diagnostic markers have been found to visually distinguish the species.

The existence of two species of rougheye rockfish motivates examination of stock structure within each species. Analysis of microsatellite molecular variation indicates that although low F_{ST} values were found for both type I and type II rockfish, indicating little divergence, both species showed statistically significant population structure based upon log-likelihood ratio analyses (Gharrett et al. 2004). In particular, for type I rougheye, the species found in the Aleutian Islands, four partitioning schemes were examined in which the samples were assigned to non-overlapping populations. Each of these four schemes indicates that significant divergence occurred between specimens from the central Aleutian Islands, the eastern Bering Sea and eastern Aleutian Islands. A similar partitioning for type II fish revealed six non-overlapping groups of populations. Overall, stronger divergence was observed for type II fish, suggesting that population structure for this species occurs at a finer scale than current management areas.

For shortraker rockfish, population structure has also been observed in microsatellite data (Matala et al. 2004), with the geographic scale consistent with current management regions (i.e., GOA, AI, and EBS). The most efficient partitioning of the genetic variation into non-overlapping sets of populations identified three groups: a southeast Alaska group, a group extending from southeast Alaska to Kodiak Island, and a group extending from Kodiak Island to the central Aleutians (the western limit of the samples).

The interpretation of the findings of genetic structure is not unequivocal. If larval dispersal and adult movements are limited then the geographic genetic structure may correspond to population productivity units. If larval dispersal and adult movement are more extensive, then at least two explanations are consistent with geographic genetic structure. First, adults may return to natal areas to spawn after being dispersed as larvae, as has been proposed for shortraker rougheye by Orlov (2001). Second, if successful reproduction in a given year derives predominately from relatively few spawners of a specific cohort, then the observed structure may reflect genetic differences between members of separate cohorts rather than geographic separation. Our current knowledge is not sufficient to fully evaluate these hypotheses, although ongoing research is being conducted by Dr. Anthony Gharrett and colleagues at the University of Alaska.

In conclusion, the best available information on stock structure for roughey rockfish suggests divergence between type I rougheyes in the central Aleutians and type I rougheyes in the eastern Bering Sea and eastern Aleutians. Geographic population structure for shortraker rockfish occurs on spatial scales roughly the size of our management areas, although shortrakers in southeast Alaska appear to diverge from other areas. It is not known how shortrakers in the eastern Bering Sea or western Aleutians relate to the large population groups identified by Matala et al. (2004) due to a lack of samples in these areas. Although the current information is not sufficient to unequivocally define genetic stock structure, the observation of genetic divergence motivates a precautionary approach of applying area-specific ABCs in the BSAI management area. It is important to note that this recommendation of area-specific harvest is not being made for the OFL. The effect of area specific ABCs would presumably reduce “topping off” on species not designated for target fisheries. As further information becomes available on the geographic boundaries to productivity units, then the question of separate stock structure and OFLs will likely need to be revisited.

The apportionment percentages are based upon survey data from the AI and EBS slope, and are unchanged from the values used in 2004. The recommendation for area-specific ABCs for 2006 are:

Species	Area Apportionment				
	AI	EBS	AI ABC	EBS ABC	BSAI OFL
Roughey	89%	11%	199 t	25 t	299 t
Shortraker	84%	16%	487 t	93 t	774 t

Responses to the Comments of the Statistical and Scientific Committee (SSC)

From the December, 2004, minutes: *“The SSC is sympathetic to the author’s recommendation to apportion the EBS and AI areas as a precautionary measure to protect a presumptive stock structure. However, the SSC notes that the appropriate boundary for a geographic split is uncertain, and requests that the assessment authors examine recent genetic data and provide their information in that regard. The SSC is also concerned with the potential for exceeding harvest specifications and requests that management monitor bycatch of these species.”* The discussion above identifies the genetic data that motivated recommendation of area-specific ABC levels for 2006.

References

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